

Hobbies

WEEKLY

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DESIGN FOR O-GAUGE
GOODS SHED MODEL

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A 17in. Model SAILING YAWL

THE time for model yacht sailing will soon be here, and many of our young enthusiasts will, no doubt, like to make up a little yacht all on their own. We give here instructions and details how to make up a model Yawl.

This type of boat is of rather picturesque rig and makes a suitable model for the beginner, as it is broad of beam and the masts and sails simple in cut and design. A good idea of the model may be gained from the sketch on this page, which, with the diagrams, should make the construction quite clear.

Our model is 17ins. long, from the tip of the bowsprit to the end of the boom of the back sail. The beam or width of the boat is 4ins., and the height overall is 11½ins. The hull is made from a piece of deal 12ins. long by 4ins. wide by ¾in. thick and cut to the shape shown in Fig. 1. The lower half of this diagram is crossed with 1in. squares to assist the worker in enlarging to actual size.

Full Size Drawings

He should set out the squares full-size on a piece of paper. Then, following each square carefully in the diagram, run a line through the full-size 1in. squares. Then trace on thin paper this half outline and, turning the paper over, complete the opposite side, thus completing the full plan of the bottom of the boat.

Transfer the outline to the wood and cut round with the fretsaw and clean up the edges with glasspaper. Next cut and fix the stern piece 2½ins. by 2ins. by ¾in. thick. It is pinned to the square end of the hull section as Fig. 2. A small bow

block is fixed to the pointed end of the boat, the actual shaping being done after it is fixed on, see again Fig. 2.

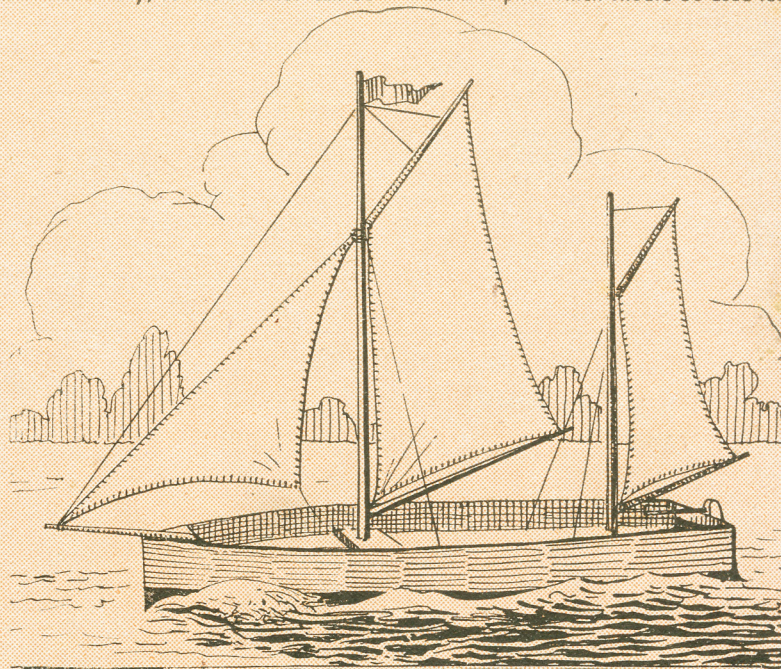
Sides

The sides of the boat consist of thin strips of wood bent round and glued and nailed closely to the floor of the boat and to the stern and bow pieces, see Fig. 2. In this diagram the forepart of the side is shown cut away, so the interior can be

seen. Each side piece is 13½ins. long by 1½ins. wide.

Take especial care to first nail the thin wood to the stern block, and then bend it round to meet the bow block where it should be cut neatly and chamfered and then nailed firmly. Waterproof glue is essential to a good fixing and a watertight hull.

Prick the holes carefully for the fine brass fret pins which should be used for



the fixing of the sides in conjunction with the glue. Brush some waterproof glue round inside the sides of the boat where they meet the floor. Two cross planks will be glued and nailed on inside the boat to take the ends of the masts.

The distance these planks should be kept from bow and stern is shown in the plan Fig. 1. The length for each plank

WOOD REQUIRED

- 1 piece deal—12½ ins. by 4½ ins. by ¾ in.
- 1 piece hardwood—10 ins. by 2 ins. by ½ in.
- 2 pieces thin bendable wood—see article.
- 2 pieces round rod—½ in. diameter, 20 ins. long.

may be measured direct from the plan so far made up, while their width is 1 in. and depth ½ in. Bore ¼ in. holes centrally through the pieces, as shown, and continue down into the floor piece for

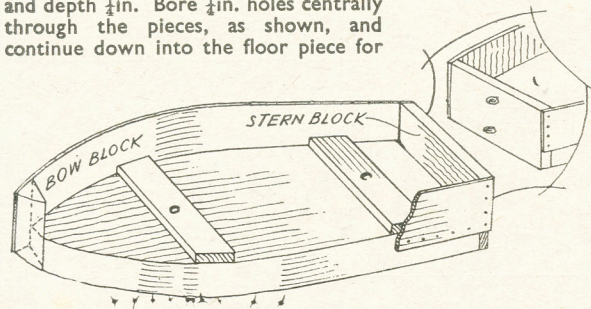


Fig. 2—Showing construction of hull

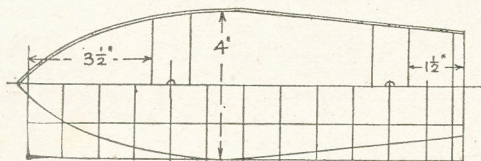


Fig. 1—Plan of main hull portion

another ¼ in. or so to gain a good fixing for the masts.

The masts are of ½ in. round rod tapered upwards, as shown in Fig. 3. The mainmast is 11 ins. long and the rear mast 8 ins. long. To them will be fixed the spars which are also of ½ in. rod, shaped and tapered off as before. The fixing is done with small brass eyes screwed in, as shown in the detail Fig. 4.

The diagram of the sails is given in Fig. 3 and from this each can be drawn out full-size on to stout brown paper. Pieces of light linen will answer well for the sails, and the paper patterns should be pinned to it and the scissors used in cutting round. Each sail should be turned in all round and hemmed neatly, a narrow margin of the material being allowed for this 'turn in' all round.

The corners where the cords come are made double and neat button-holes stitched round ready for the rigging. Small brass screw eyes run into the top surface of the floor will take the running rigging.

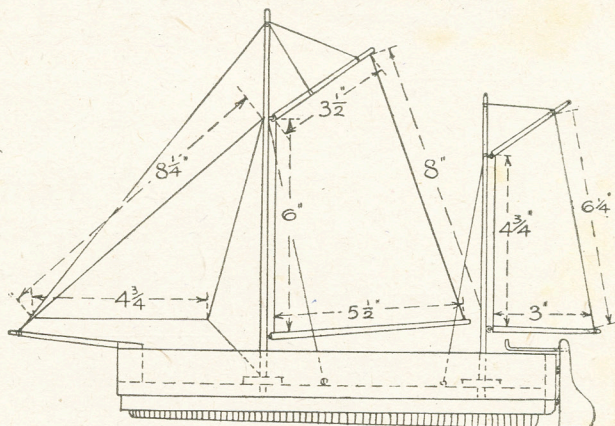


Fig. 3—Side view of hull with details of sails

The bowsprit rests upon the bowblock and is pinned to this and to other small blocks each side and in the boat.

The rudder is cut from a piece of ½ in. wood, as shown in Fig. 5, and the tiller arm made from a piece of wire 1½ ins. long pushed through a hole in the top and bent down to make a secure fixing. Two brass eyes will be put centrally in the stern of the boat to receive the two projecting wire staples fixed in the rudder, just as the diagrams show.

The whole boat must first receive a thorough cleaning off with coarse and fine glasspaper, and then given two coats

of paint thoroughly brushed into the grain of the wood. A light glasspapering should next be given, and finally a coat of enamel of the chosen colours. The inside of the boat should receive the same amount of care in the painting to make it perfectly watertight.

For Floating

The hull when finished should be tested for buoyancy in a bath of water and note made regarding the depth to which the sides sink in the water. It will be found that by tacking on strips of lead temporarily and of varying widths, the correct buoyancy can be got. The



Fig. 4—Spars fixing

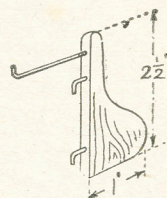


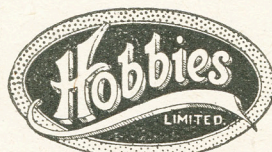
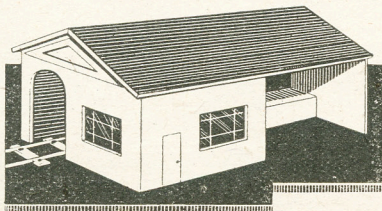
Fig. 5—The rudder

actual strip of lead nailed on should be in one piece and of the full weight required, after test. A coat or two of paint should be given on the lead.

The rigging may consist of coarse thread looped, tied and bound to bowsprit and masts, as the full diagram Fig. 3.

This Week's Gift Design for a Model O-Gauge Goods Shed

The large Design Sheet this week is for another of our series of O-Gauge Model Railway Series. With it you can make quite easily a realistic addition to your lay-out. Station and Engine shed have already appeared. A complete kit of material for the Goods Shed shown here (No. 2846) is obtainable from any Hobbies Branch for 10/2, or sent post free for 10/11 from Hobbies Ltd., Dereham, Norfolk.



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How to make an interesting working model of THE JOLLY MILLERS

HERE is a toy that will cause great amusement for the youngsters. The endless stream of millers as they plod along, laden with sacks of corn, from the corn shed to the mill, the turning sails and the man in the mill popping his head out of the window, are all set in motion by turning the handle.

A toy like this is always welcome for boys between the ages of four and eight, and the making is well within the scope of most readers. The toy can be made from scrap pieces of wood and metal, and although all the details are given, these may be varied to suit the available materials.

Making the Base

Details for making the base are shown in Fig. 1. The sides and ends are made from $\frac{1}{2}$ in. planed softwood and the top

prevent the inquisitive from seeing how many millers there actually are.

The Corn Shed

This can be made from plywood or pressed board. If plain wood is used, it should be thick enough to take the fixing screws which secure it to the base of the toy. If plywood is used, $\frac{3}{8}$ in. square strips should be tacked and glued on in the positions shown in the drawing. The hinges for the doors are shown in Fig. 1, made from strips of rubber (car

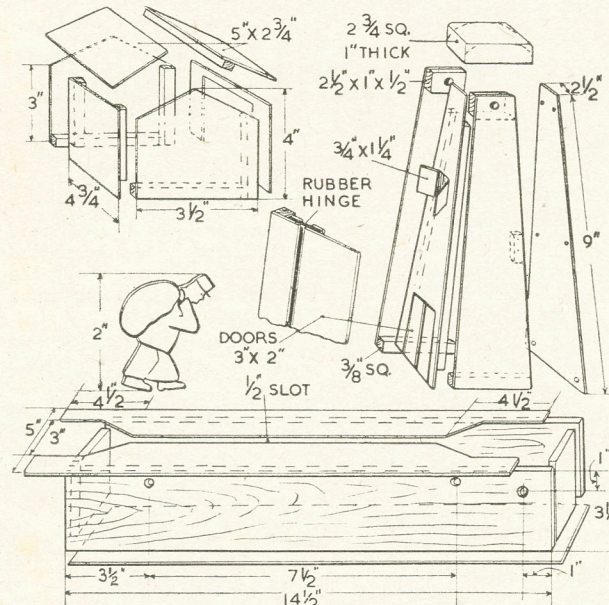


Fig. 1—Details of various parts in construction

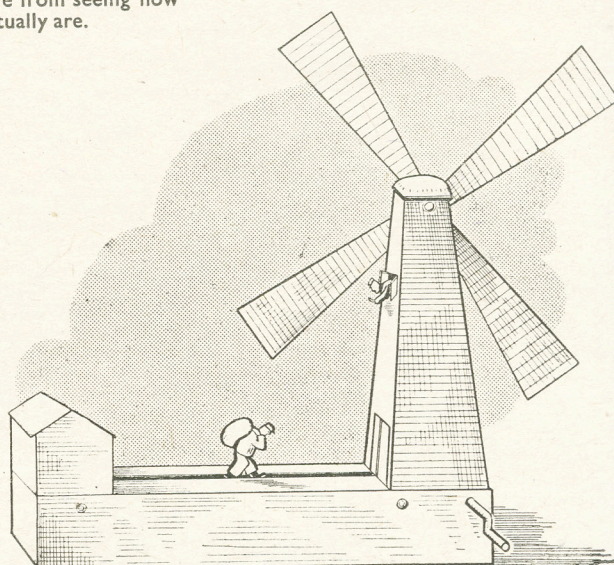
and bottom from plywood. When the two sides have been cut to shape, they should be gripped together and drilled. It is important the drill is held square so the holes are exactly parallel in both sides. When this is done, screw the sides to the ends.

The top is made in two pieces. These should be identical so the slot for the figures to move along in is in the centre. The wide slots at each end should be tapered off into the narrow slot. This will give a lead in for the figures as they travel along. The two pieces are screwed in position after they have been fixed to the corn shed and mill.

The bottom is cut to size but it is not screwed in position until the end. It is fitted mainly to hide the works and

The Mill

The four sides can be economically cut from one piece of plywood. Strips $\frac{3}{8}$ in. square are glued and tacked in position as shown in Fig. 2. The pieces which are cut out for the doors and window spaces, if cut carefully, can be used as doors and windows. The doors are fitted with rubber hinges, the same way as for the corn shed, taking



inner tube).

When in action the figures push through the doors which automatically close afterwards. To prevent sticking, it is important that a gap of about $\frac{1}{8}$ in. is left all round the doors. The strips of plywood which secure the hinges can be fixed with panel pins.

care, as before, to leave an $\frac{1}{8}$ in. gap all round.

The windows are fixed in the open position. If they were made to shut, they would tend to trap the man as he bobs back. The roof is cut from a piece of 1 in. thick stuff, chamfered at each side.

The holes for the sail spindle must be exactly parallel, so after the 1 in. by $\frac{1}{2}$ in. strips through which the holes are drilled, have been fixed to the sides, the sides should be gripped back to back and drilled. The holes should be about $\frac{3}{16}$ in. diameter to allow for the slope of the sides when built up. To reduce friction the spindle is best mounted in metal pins.

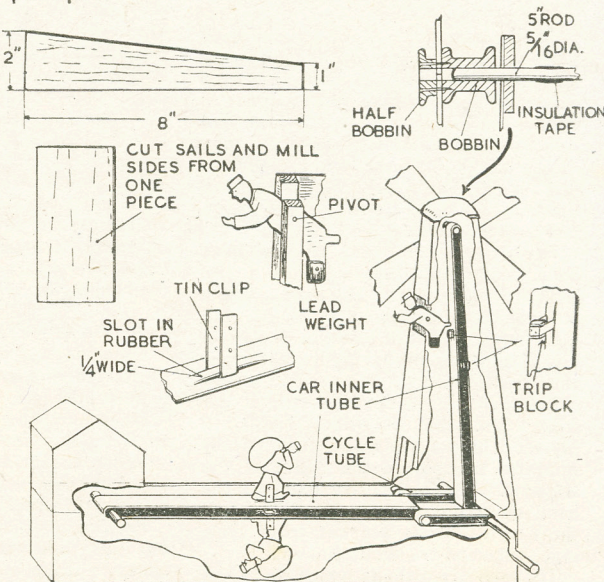


Fig. 2—The sails and general mechanism

plates screwed to the sides, but these are not absolutely essential.

Before the mill is assembled, the figure for the window should be made. This is cut from plywood and a piece of lead is tacked to the lower end to form a counter weight. A $\frac{3}{16}$ in. hole is drilled through the waist line for the pivot pin. The two $\frac{3}{8}$ in. square strips which are

in steel, about $5\frac{1}{2}$ ins. long. The handle is made from the same material, about 9 ins. long.

Assembling

First screw the corn shed and the mill to the two pieces which form the top of the base, leaving a $\frac{1}{2}$ in. slot in the centre, between the two pieces. Screw the

sulation tape. This will keep the drive band running in the centre and provide a better grip. Thread on the main band with the two figures, and on the middle shaft, the two small bands, one each side of the main band.

Pass the two shafts through the second holes, fit washers to each end, and burr over to keep the washers on. Fit the handle and wrap the centre with tape, add the drive bands and fit a washer to the other end and burr over. Fit the sails and spindle and connect up the drive belt. When it is seen that the model is working correctly on turning the handle, screw the back of the mill in position. Finally fit the bottom of the base.

Painting

Give the model a coat of priming paint of a neutral shade—such as grey—and follow with a coat of the selected colours in enamel or hard gloss paint. A suggested colour scheme is as follows. The base—bright green, the mill and corn shed sides—bright red, the roofs and sails—cream, the figures—red and blue. (143)

LIST OF MATERIALS

Base	Figures
14 $\frac{1}{2}$ ins. by 3 $\frac{1}{2}$ ins. by $\frac{1}{2}$ in.—2 off, planed soft wood	3 ins. by 1 $\frac{1}{2}$ ins. by $\frac{1}{8}$ in.—3 off, plywood
14 $\frac{1}{2}$ ins. by 3 $\frac{1}{2}$ ins. by $\frac{1}{8}$ in.—2 off, plywood	Metal rod
5 ins. by 3 $\frac{1}{2}$ ins. by $\frac{1}{2}$ in.—2 off, planed soft wood	$\frac{5}{16}$ in. diameter
Mill	5 in. length, 1 off
9 ins. by 4 $\frac{1}{2}$ ins. by $\frac{1}{8}$ in.—4 off, plywood	5 $\frac{1}{2}$ in. length, 2 off
3 ins. by 3 ins. by $\frac{1}{2}$ in.—1 off, planed soft wood	9 in. length, 1 off
24 ins. by $\frac{3}{4}$ in. square—1 off, planed soft wood	Sundries
6 ins. by $\frac{1}{2}$ in. by $\frac{1}{2}$ in.—1 off, planed soft wood	Old car inner tube
Corn shed	Old cycle inner tube
3 $\frac{1}{2}$ ins. by 4 ins. by $\frac{1}{8}$ in.—2 off, plywood	Cocoa tin
5 ins. by 3 ins. by $\frac{1}{8}$ in.—4 off, plywood	5 ins. of $\frac{1}{8}$ in. diameter wire
24 ins. by $\frac{3}{4}$ in. square—1 off, planed	6— $\frac{1}{8}$ in. washers
Sails	Screws, panel pins, glue
8 ins. by 2 ins. by $\frac{1}{8}$ in.—4 off, plywood	

fixed to the side are then drilled to take a piece of $\frac{1}{8}$ in. wire, on which the figure swings. A 5 in. length of $\frac{1}{8}$ in. wire is then pushed through the holes, with the figure threaded on, and the wire is then bent over at each end.

The two plain sides of the mill can next be glued and tacked to the door side. The side opposite the doors is not screwed in position until the end, after the toy is in working order.

The Sails

The sails can be cut from plywood and in a similar manner to that of cutting the mill sides, from one piece. The four pieces are then screwed to a cotton bobbin into which is driven tight, a 5 in. length of $\frac{5}{16}$ in. rod made of metal. Another bobbin is sawn in half and screwed to the front of the sails to hide the joints. The spindle is later passed through the mill, a washer fitted and the end of the rod burred over.

The Working Parts

The figure for the window has already been made. The two other figures are cut from plywood, as shown in the drawing. These are secured to a band of rubber 1 in. wide cut from a 5 in. car tyre inner tube; a suitable piece of old tube can be bought from the local garage for a few pence. The figures should be fixed diametrically opposite so there is always one of them in view.

For fixing each figure to the drive band, make two $\frac{1}{2}$ in. long cuts a $\frac{1}{4}$ in. wide in the centre of the band. Cut a strip of cocoa tin about $1\frac{1}{2}$ ins. by $\frac{3}{8}$ in., bend it through the band, as shown in Fig. 2, and tack on the figure with four small panel pins.

The drive band for the sails is cut from a 5 in. tube, $\frac{3}{8}$ in. wide. Two small plywood blocks are fitted diametrically opposite to operate the figure at the window. The blocks are fixed to the band by strips of cocoa tin. The two short drive bands are cut from cycle inner tube and are about $\frac{1}{2}$ in. wide.

The two drive shafts which drive the figures are made from $\frac{1}{8}$ in. rod or tube

assembly to the base. Fit the two driveshafts, and wrap the centre of each shaft with three or four layers of in-

Curing Rabbit Skins

CURING rabbit skins is really quite easy—when you know how. The cured skins can be used for glove making and so on. It will be best to start on the skin that has been stripped from the rabbit due for the dinner table and then, when the small difficulties have been met and overcome, a good quality pelt can be tackled.

No Fat Wanted

To start off put the skin fur side downwards on to a board and fasten it in this position with four $\frac{1}{2}$ in. nails. Carefully pull off every bit of fatty tissue. Quite often this will peel away, but if it does not, use a fairly sharp knife to scrape it away. Take great care not to cut through to the furry side.

When the skin side is completely clean, prepare a mixture of one tablespoonful of salt and one of powdered alum. Take a little of the mixture at one time and with a circular motion rub it well into the skin. This part of the operation is most important. See you cover every part of the skin and make the rubbing-in thorough and complete.

Four Week's Dripping

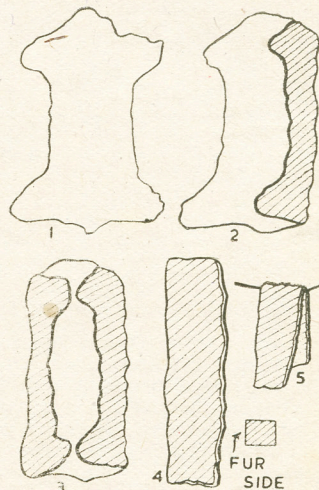
Take the skin off the board, fold it as illustrated, and hang it up in a dry place. It must stay here untouched until it has finished dripping, which might take anything up to four weeks.

When the dripping has finished, take the skin down and wash it thoroughly in clear warm water.

Prepare another bath of warm water but this time add toilet soap or soap flakes to make a really good lather and

give the skin another good wash in this. Finish off with a bath of clear warm water, fold the skin as before and again hang it up until it stops dripping.

Part of the operation is now called 'working over'. For ten to fifteen minutes every day, while it is drying, the skin must be rubbed and stretched



between the fingers to stop it from stiffening.

When it is nearly dry, rub in a little saddle soap. If, in spite of your 'working over' the pelt still appears to be rather stiff, get a little neatsfoot oil and rub this into the skin.

Your pelt is now thoroughly cured and ready for whatever use you have in mind for it. (141)

Now is the time to make radio preparations for GARDEN LISTENING

THOUGH the instructions given here are particularly applicable to summer-time outdoor listening, they can also increase the sphere of interest and usefulness of a radio within the house. Quite often it is worth while having a speaker in a second room (for example, in the kitchen, or in a bedroom), and it may be driven from the receiver without disturbing the latter.

Sometimes it will be found such extension systems are very much appreciated. Outside the house they can increase the pleasure of evenings in the garden, while special uses for parties, etc., will soon come to mind.

The simple diagrams have been drawn so that those with little knowledge of radio should have no difficulty in fixing up the system they decide will suit them, while the handyman used to radio should gain valuable hints.

Simplest System

This is shown in Fig. 1 and has the advantage that only a single wire is used, and that no direct current flows along it. Consequently there will be no danger of shocks from mains sets, and thin wire, only temporarily hooked up if convenient, can be used.

A condenser of about 1 mfd. should be connected to the anode of the output

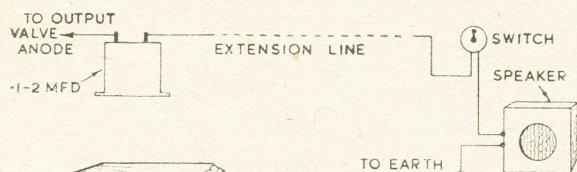


Fig. 1 — A condenser-fed speaker

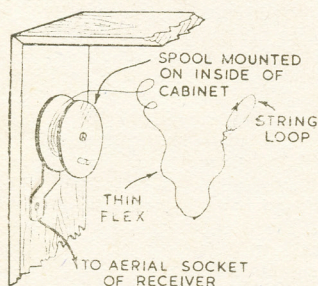


Fig. 3 — A throw-out aerial

valve. (A wire will go from the anode to the speaker transformer, and this will help identification of the correct point). This condenser may be placed inside the receiver cabinet and the extension wire is taken from its second terminal.

The other end of the extension wire (which may, of course, be many yards long) is taken to the extension speaker. In the diagram a switch is included in circuit so that the listeners at the extension point can switch their speaker off if desired. The speaker is returned to a metal skewer or other earthed object.

For best results the receiver should

also be earthed in the usual way, though this is not wholly necessary. The speaker must be of the ordinary high-impedance type. If it is being used in a bedroom, then a second lead may be returned to the earth socket of the receiver, if this is more convenient.

Low-Impedance Extension

If a moving-coil speaker with no coupling transformer is to be used, then the connections shown in Fig. 2 should be adopted. Twin flex is taken from the secondary of the transformer to the extension speaker, a switch again being put in circuit if desired. This switch may be mounted on the speaker cabinet.

If it is required that the extension speaker should operate alone, the speaker in the receiver may be silenced by connecting a switch in the lead at the point marked (X) in Fig. 2. Some receivers have provision for this on the back. Extension Speaker sockets may also be fitted, and this will simplify connections.

If the speaker shown in Fig. 1 is returned to the receiver instead of to a separate earth, twin flex should not be used for the two leads unless these are not more than a few yards long. Otherwise the capacity will make reproduction somewhat low-pitched. Separate

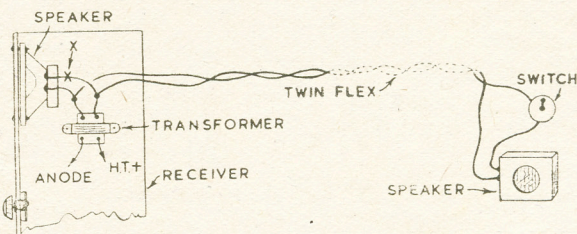


Fig. 2 — Low-impedance extension
ALMOST ANY LENGTH (SEE TEXT)

leads should, therefore, be used, though twin flex is suitable for Fig. 2, where the impedance is low.

Throw-Out Aerial

Most receivers will give ample volume on the more powerful stations with no earth and only a short wire for an aerial. This enables the receiver to be made into a type of portable, which may be taken outside or into another room as necessary.

To do this, a reel should be mounted on a metal bracket inside the back of the receiver (A typewriter spool is ideal). The metal bracket is connected to the Aerial socket of the receiver, as shown in Fig. 3. About 3yds. of thin flex are wound on the spool, the inner end being connected to the metal so that the circuit is completed through the pivot bolt and bracket. A loop of string (to provide insulation), is tied to the other end of the flex.

In use, it is merely necessary to draw

out the wire (the full length need not be used if inconvenient) and an aerial is immediately available, already connected to the receiver. The wire may be laid along the floor, hooked to a picture, or otherwise extended as circumstances allow.

A small handle can be fitted to the spool to facilitate rewinding when the receiver is to be moved again.

Remote On-Off Switching

With the two systems described in which extension speakers are used, the receiver cannot be switched on or off from the remote listening point. Often this is little inconvenience, but if it is desired the receiver be controlled from the extension speaker, a switch wired as shown in Fig. 4 can be used.

Though a pear switch is often most convenient, any other type can be used if no bare connections are left. As the twin flex leads will carry from about .25 to .5 amp., good-quality wire is essential, especially if the leads are at all long (over, say, 10yds.).

In the case of a battery-operated set the switch is merely introduced in one low tension lead, as shown. With a mains set it is introduced in one mains lead.

Some voltage drop in the mains



Fig. 4 — Extension on-off switch

circuit will be immaterial, but with a battery receiver the accumulator only provides 2 volts and, because of this, volume will be reduced slightly if the leads are too long. But provided the flex is reasonably stout, several yards may be used, as mentioned.

Relays, Volume Control, etc.

A relay which closes circuit when energised could be used to switch on the receiver, but this is only necessary when the extension point is a long distance away and direct operation (as in Fig. 4) becomes impossible because of the resistance of the leads.

A volume control at the extension

(Continued foot of page 102)

Napoleon is said to have passed the time with this SIMPLE GAMES NOVELTY

THERE is rather more in this game than might at first appear. It is very old and comes from the Far East, where it was employed to amuse young and old alike. Napoleon used it to while away the time during his exile in Elba and it is reported that he made the necessary pieces from black cardboard.

Plywood, $\frac{1}{8}$ in. thick, is really best for the sections, and to make the game a rectangle 5 ins. square is required. This is then marked out as Fig. 1, the points (A) and (B) being midway along two adjacent sides. With this in mind and the knowledge that the line (C) bisects the

$\frac{1}{2}$ in., but are bevelled at the corners to meet each other, as shown.

A simple lid is then fitted. This is a $5\frac{1}{4}$ ins. by $5\frac{1}{4}$ ins. piece of thin plywood held by a cloth hinge as (D). The strip of cloth is well glued and fitted along the end of lid and box, and then taken over both for about $\frac{1}{2}$ in. The strip must be pressed into good contact with the ends as it is required to stick firmly here and bend only along the crease.

Lid Fastener

At the further end a tab fastener is put on. This is a strip of thin leather glued below and taken over a pin head on the lid. A small draper's pin is used for the

Quite rough suggestions of features will do as indicated.

The Figure Pieces

All is now finished and the object is to build up various figures with the sections. There are an infinite number that can be made and four are given here. The range of possible attitudes is very large and the scope increased by having both a full and side face to play with. It is strange how lifelike are some of the make ups, while quite a lot will be really humorous.

If the sections are in black, the best effect is secured by giving 'players' a small sheet of white card upon which to do the arranging.

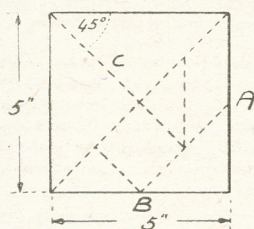
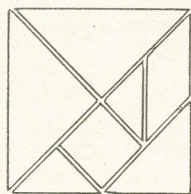


Fig. 1—Shapes to mark



THE SECTIONS
Fig. 2—Cut parts

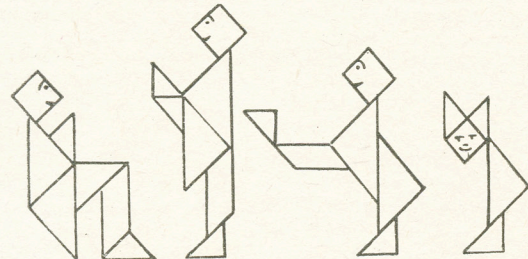
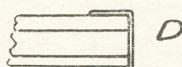
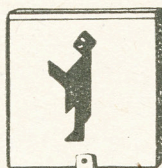


Fig. 4—Queer people made with the parts shown



HINGE



LID

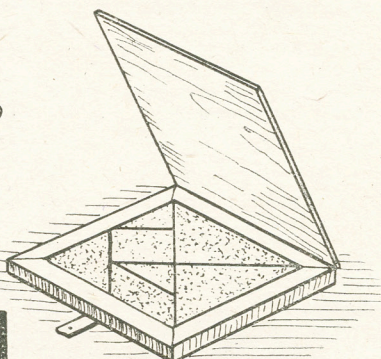
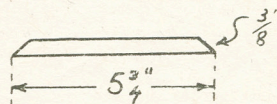


Fig. 3—Details of box, lid, hinges and fastener



angle from which it extends (that is, divided into two angles of 45 degrees each), the lines are easily put in.

The square is now divided up as Fig. 2, some little care being taken to get accurate cutting, as the pieces must fit neatly side by side whichever way up they happen to be.

A Tray Box

So the sections will not get lost, and to give a good effect when handing the puzzle out to a friend, now make the shallow tray container as Fig. 3. This is a square of $\frac{1}{8}$ in. plywood, $5\frac{1}{4}$ ins. by $5\frac{1}{4}$ ins., upon which is glued four border strips that to start with are $5\frac{1}{4}$ ins. by $\frac{1}{8}$ in. by

lid—being pushed right through and then bent over.

Now back to the sections. These must be smoothed off and then coloured one uniform tint. Black can be used like Napoleon. This is not as sombre as might be imagined and was often used for the individual 'section games' of the Victorian era. Thus dominoes still often have black backs. Other colours may, of course, be put on, but all the pieces must be the same back and front.

Lastly take the small square section and in white or a variety of colours, paint two faces, one on either side. The first must be a side face (comical, if possible) and the other a full face.

The shallow box container can be left in plain wood, stained and polished or painted, but the lid looks well finished with a silhouette of one of the figures that can be made up, say, the sitting man which is shown first. This can be carefully drawn out on card and then blackened in with Indian ink and glued on. There is, of course, no need to indicate the divisions of the pieces in this silhouette.

Quite a lot of fun can be obtained from this section game and it should certainly be made to go with your collection of wood puzzles, to be brought out with the rest when some indoor entertainment is required.

Garden Listening—(Continued from page 101)

point, to operate on the extension speaker only, may be provided by connecting a variable resistance of about 5 ohms to 10 ohms (the value is not critical) in series with the speech-coil. This control can be mounted on the cabinet holding the extension speaker.

If it is desired to select various stations from the extension listening point, this can be done by means of relays and pre-set condensers. Relays and pre-sets should be mounted in the receiver, the latter being adjusted so that the desired stations are brought in

when the appropriate relay is energised.

The writer has found this a very simple and trouble-free system. However, this particular adaptation is not by any means necessary, though the radio enthusiast may like to try something out along similar lines.

Geography, town, country or seaport realistically illustrated in AREA MODELLING

WHILST the fretsaw may have been primarily thought of in connection with fretwork in former days, it is, undoubtedly, now being used for a much greater variety of work. Here are some suggestions of the usefulness of this tool in conjunction with a specialised type of work which will, undoubtedly, appeal to many readers. It is particularly appropriate, and is much in demand, we find, for schools, for groups of modellers, and even for architects and surveyors.

Its usefulness in these spheres could cover such practical and educational purposes as map making, town planning, village layout, and even small housing estates. A number of readers have, as we know, even gone to producing a layout of their own district, which incorporates certain historic buildings, monuments, etc.

Simple Small Work

All of it, of course, is miniature work, but the scale is so small there is really no need to get a great deal of detail in the actual parts. Let us then look at some of the possibilities of such work which may suggest itself to readers for their own particular need or ingenuity.

During the war, for instance, we published a series incorporating miniature ships of war, and with them was a complete layout for a harbour,

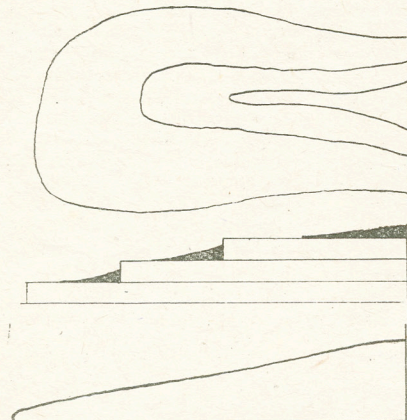


Fig. 1—Showing the building up of rising ground

quaysides, wharves, docks, etc. There is not, of course, now the demand for these war-time types, but the idea could quite easily be carried into effect by those living at seaports or those who are desirous of making models of some special seaside layout, such as Southampton, the Mersey mouth, etc. If you are undertaking your own particular district, then you could enlist the assistance of local authorities who would be helpful.

A large-scale map of the place would help, and you first of all have to prepare

your scale to know that all the parts are in correct proportion. A port authority would help in this, or the local surveyor's office could provide the necessary scale plans if you approached them properly.

The whole of the layout should be undertaken first as a drawing, in order that you may know the area decided upon, and the space which the actual model would take. The dimensions of the over-all subject would be fairly large, and this is where co-operative effort in a school or a club would be of advantage. If you are having a large layout, have trestled tables big enough to take it all, and roughly draw the layout in position.

Land Contours

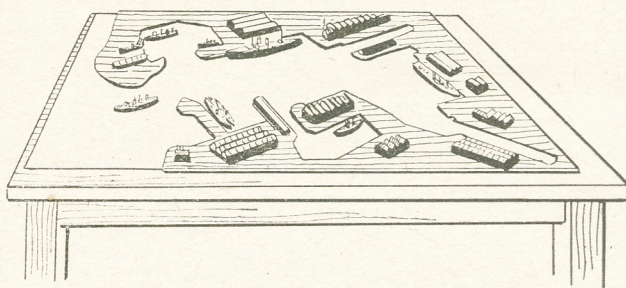
The contour of the land, the shape of the river and harbour, and the dimensions of docks, tidal basins, etc., would be first of all put in place. The actual land portions could be cut in plywood if you can obtain it, or failing this, some of the fairly thick composition board would do quite well. It should be at least $\frac{1}{4}$ in. thick to raise the land portion of the sea.

If then you had further heights in the land, additional layers of wood could be added when worked out to their proper contours according to the map. These 'hills' can be built up by layers of wood of varying thickness, and an idea of them is shown in Fig. 1. At (A) you have the plain contour, at (B) is a section drawing showing the three layers of wood which build up the main substance of the hill. Finally at (C) you have the wood shaped off into one piece by tapering down to form the continuous hillside.

Ground Work

The sharp angles where the pieces of wood are joined together, can be smoothed out slightly by filling in with plastic wood, Pyruma or similar filler. This is shown by the solid black portions in the diagram at (B), then finally when the whole lot is filed down, you get to the shape shown at (C). The surface can be given a roughcast covering with glue and sand before it is painted with suitable colour for ground effect.

The buildings will be quite tiny compared to the general layout, and it is unwise to endeavour to incorporate all of them, or much detail in those which are shown. Small blocks of shaped wood are sufficient indication, unless you are



A layout of a Tidal Basin with Quays, Wharves and Ships

having a large-scale subject. If it is large enough, you could paint on very tiny doors, windows and outstanding features, but otherwise the plain rectangles or shapes of the wood are sufficient. Some suggestions are shown at Fig. 2.

Building Shapes

The tops should be planed to the slope of a roof, and this is one of the points you will have to note in the preparation of the plan itself in comparison with the actual buildings. Modern buildings are more easy to indicate because in many instances they are straightforward cubes, and frequently even with a flat roof.

If, again, there is some unusual shaped building, this definitely helps to identify the part concerned, and should be as nearly as possible in scale with the others. Special buildings such as churches, dock board offices, warehouses or open wharves should be clearly identifiable, and even finished a different colour from the rest for that reason. These miniature buildings can quite well be solid blocks of wood, and if the area has a number of rows of houses, quite a lot of them can be incorporated in a single piece.

Sizes to Scale

One general failing in this type of work is that the buildings themselves are too large in proportion to the rest of the work. It is better to keep them quite small so they do not overpower the general layout, but at the same time are obvious in their positions.

The position of each of these buildings should be marked on your original layout, but the parts themselves should not be fixed in place until the whole thing is virtually finished. This involves further preparation for the final details of painting. There are roads to be added, with their sidewalks indicated if the scale is large enough.

If wooden fences are provided, they can be indicated by tiny strips stood on edge. The actual pavements need not be raised from the ground level, but can be clearly shown by a white line painted to show the line and angles of the curve. If

you have a large-scale layout, then you may like to add the pavement as a thin layer of material.

Water and Wharves

If, continuing our original suggestion of a harbour, you have water, it can be painted in light blue, with splashes of white to indicate the flecks of the waves. This is if the water indicated is supposed to be tidal. If it is inland water—

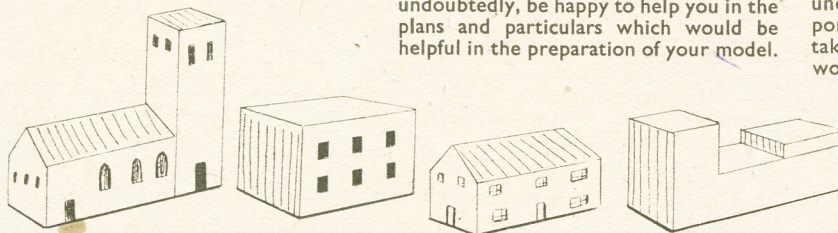


Fig. 2—Examples of simple blocks forming large buildings of different shape

lakes, etc.—then, naturally, a perfectly smooth surface is sufficient. In the harbour effect you will need the tiny boats lying at the quaysides or, perhaps, buoyed in the middle of the river. The wharves can be fitted with tiny cranes and merchandise piled up on the quays. All this, of course, is very small, but a realistic effect is obtainable without a great deal of trouble. We have elaborated largely on this picture as of a port.

Your Town Centre

A little thought, however, will show how the same general plan could be carried out in relation to other sites. You may like to plan your own market or city square with its streets, radiating from the centre, the station, city hall, churches, etc., in their position in the district. In this case, the roads will contain tiny specimens of traffic-island sites, traffic lights, trolley buses, tram or ordinary double-deck buses such as seen in the local service.

Most of these tiny parts can originally be cut with the fretsaw, but can be shaped with a sharp knife and finished smooth with glasspaper. Here again, paint is added to get the finished result, but this should not be undertaken except by those capable of getting a good result.

So often we have seen otherwise good models spoiled in this way. Portholes have been made on ships much too large, windows on houses are out of all proportion to the prototype. Motor cars may have a huge number plate on them, which spoils the whole effect. It is this attention to detail which will make or mar the subject, and in no case should the work be hurried.

Painting Hints

A fine brush is used for painting and poster paint or enamel is useful to get the style required. Brickwork can be indicated by very thin lines indicating the course of the bricks, and here again, if you cannot get it in proportion, that work is best left undone. The architect or surveyor frequently uses this type of model for a single house, or for illustrating a layout in a new estate. It gives

a much better visual idea of the whole thing than many paintings or drawings.

If you live in such an estate yourself, it would be interesting for you to make such a model, or you could even approach the people concerned, with the suggestion that they might be pleased to display the subject after you had completed it for them. If there is a new theatre coming along, or a new swimming pool suggested, the promoters would, undoubtedly, be happy to help you in the plans and particulars which would be helpful in the preparation of your model.

Schoolteachers or those in charge of children would probably like the idea for their pupils to prepare a complete layout of the school buildings and surround. Such a subject would, undoubtedly, appeal to the children themselves as being of interest in their own parts. Extended to a matter of geography or history, there is much that can be planned in these directions.

If a visit is being paid during the

summer to some historical building or place, an added interest could be worked into it by getting each of the visitors to pay particular attention to some part so that when they return, they may be able to draw, or by a co-operative effort, model up the whole layout of what they have seen.

Programme of Work

The beginner should not attempt to undertake too much at first. A small portion of the town or site should be taken in hand to see how best to do the work, and what standard of result can be obtained. It is necessary to arrange and plan, and draw out as much as possible before the actual work of construction is undertaken.

There is no need to attempt to complete the whole thing in one or two evenings. Each piece is given whole attention until a satisfactory result is obtained, and then that can be put in its place in the general scheme of things.

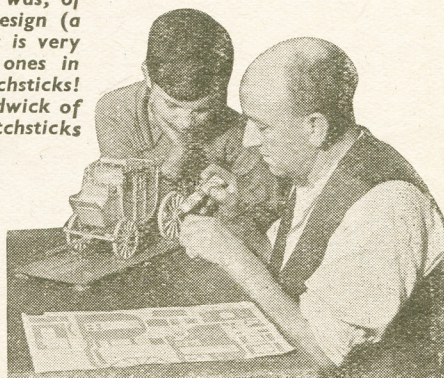
In this way, the worker gets a variety which will prevent the likelihood of getting tired before the subject is completed. In this way, too, the worker is gradually building something which will be attractive, novel and an everyday reminder of his practical ability in turning his craftsmanship to sensible results.

TWO TYPES OF MODEL



THE delighted 5-year-old you see is, naturally, proud of the Doll's House which her father, Mr. R. H. Davison, of Chudleigh Road, Nr. Crumpsall, Manchester, made for her. The house and garage fitted with electric lighting, rooms have skirting and picture rail, chromium handles to doors, and a fully balustraded staircase. The house, of course, is complete with furniture, and curtains are hung at all windows. As a keen reader of several years standing, Mr. Davison can be justly proud of his work.

THE Stage Coach you see was, of course, made from our design (a copy of which is seen) but it is very different from the ordinary ones in that it is constructed of matchsticks! The clever builder is Mr. Chadwick of Hull, who used over 9,000 matchsticks in the attempt and ensured their being held together satisfactorily by using Britfix Balsa Cement as the adhesive. The work involved was certainly more 'fiddling' than if the normal method of wood and fretsaw was adopted.



How to make one or several units of a modern CONCRETE GARDEN FRAME

A HOME-MADE Garden Frame will pay for itself in one season, providing it is used properly. In the spring it can be used for rearing bedding plants, which are followed by cucumbers, and at the end of the summer it can serve for protecting chrysanthemum stools. Or it can be filled with autumn sown sweet peas, onions, lettuce and snaps.

Garden frames can, of course, be made in several ways and of various materials. The materials chosen in this article were arrived at after using wood, brick, and asbestos for the sides, and glass for the light. Concrete was finally chosen for the sides, because it is economical, takes less room than bricks, and is warmer than wood or asbestos.

Windowlite was chosen for the light because it is easy to fix, light in weight, does not stop the ultra-violet rays, and small seedlings do not get scorched in

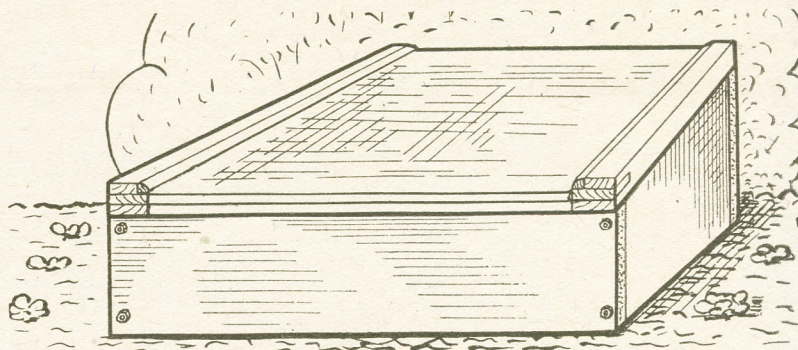


Fig. 1—View of completed frame made as one unit

the dividing side and fitting connecting plates, as shown in the drawing.

The sides are made of a mixture of gravel, sand and cement to the proportions of 2 : 2 : 1, respectively. These are cast in wooden frames 2ins. deep made of timber at least 1in. thick. The frames for casting should be nailed together at the corners, and provision must be made for casting in the fixing bolts and the bolt holes. Holes should be drilled in the frames at the appropriate positions to take the fixing bolts. The bolts should be a push fit in the

holes so that they keep in position while casting.

When the concrete is set, the frames are knocked apart, leaving the bolts in position. A size of $\frac{3}{8}$ in. diameter is quite suitable. The holes for the bolts are cast in by leaving pieces of $\frac{1}{2}$ in. dowel in position until the concrete is almost set. The dowels should be greased to prevent sticking and they should be pushed into the concrete while it is wet, using a drilled board as a locating gauge. The gauge should be drilled to suit the position of the bolts in the mating sides and it should be held in the same position on the frame each time it is used. This will ensure interchangeability.

Casting Process

The frames should be placed on a flat floor for casting. A concrete floor will do nicely, but precautions must be taken to prevent the concrete sticking to the floor. Sticking can be avoided by spreading the surface with a coating of grease, but if a path or drive is being used to cast on this will be out of the question. Another method to prevent sticking is to

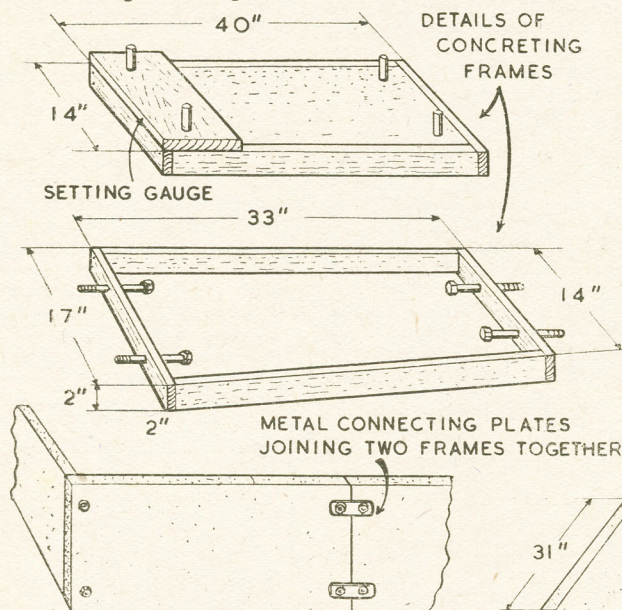


Fig. 2—Details for casting and extending

the hot sun. All the materials needed to make a frame to cover about 1 sq. yd. should not cost more than £1.

Your Own Size

The size of the frame will be to suit one's own requirements, but in order to give some definite instructions a convenient size of 38ins. by 35ins. is given, as this will use just 1 sq. yd. of Windowlite. The frame, too, will be sufficiently large to accommodate a handy number of bedding plants and later, one cucumber plant.

The area can be increased, of course, by making as many of these units as required and joining them by leaving out

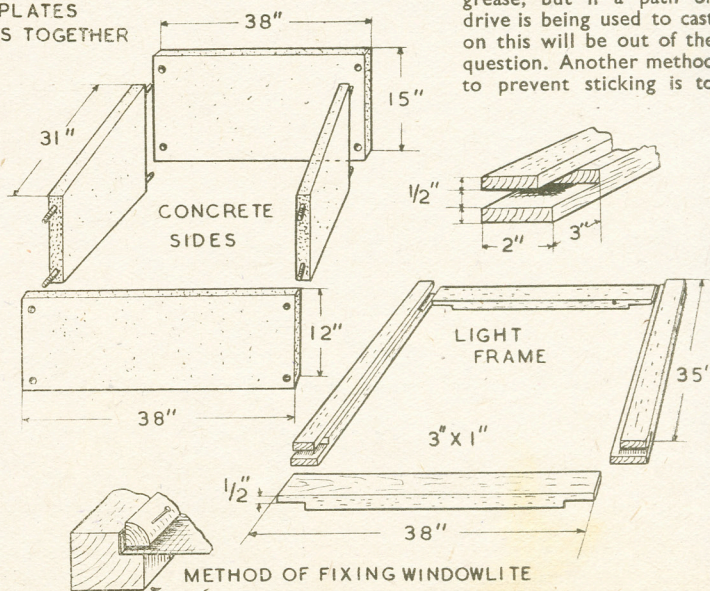


Fig. 3—Main dimensions and constructional details

place a sheet of newspaper in the frame before pouring in the concrete.

Approximately $1\frac{1}{2}$ heaped buckets of sand and the same amount of gravel, together with a flat bucket-full of cement will be required for each piece. These should first be mixed dry, either on a board about 1yd. square or on a concrete floor. Water is then added through the rose of a watering-can and the mixture turned over until it is in a semi-fluid state.

Smoothing

The mixture should then be poured into the frames, taking care to work it well into the corners with a trowel. A piece of board about 4ins. by 1in., a few inches longer than the width of the frame should be used to level off the concrete. The wet concrete should be knocked down with the edge of the board, this will bring the fine stuff to the top and leave a smooth finish.

After an hour or so, the surface should be smoothed over with a plasterer's float or a bricklayer's trowel. The castings should not be manhandled

MATERIALS REQUIRED

Timber	
35ins. by 2ins. by lin., planed and rabbeted—2 off	
38ins. by 3ins. by lin., planed and rabbeted—2 off	
$\frac{1}{2}$ in. quarter moulding, 35in. lengths—4 off	
Concrete	
Washed gravel. Approximately $1\frac{1}{2}$ cwt.	
Washed sand. Approximately $1\frac{1}{2}$ cwt.	
Cement. Approximately 1 bag	
Rough timber for casting frames	

until they are thoroughly dry. Under normal conditions this should take two or three weeks. When they are a light grey colour and lost all the green look, they can be assembled and secured with washers and nuts.

It is essential that as much light as possible is admitted into the frames, therefore, sashbars are not used. First the wood frame is made, consisting of two side pieces of 2ins. by $1\frac{1}{2}$ ins., each with a $\frac{1}{2}$ in. square rabbet to take the Windowlite. The top and bottom rails are made of 3ins. by 1in., all of it planed.

Mortise and tenon joints are made as shown in the drawing, and the joints are held together with wooden pegs. The frame is assembled and given a coat of priming paint. When dry the Windowlite, 1 sq. yd., is secured in position with $\frac{1}{2}$ in. quarter-round moulding, down the sides and top and bottom as shown in the drawing.

If it is decided to make extensions, all that is necessary is to unbolt one side, move it away and fit an extra end piece at the top and bottom, joining up with connecting plates as shown. Another light is made of the standard size, and double the area is covered. (144)

For Draughts or Chess make yourself A CHEQUER BOARD

THIS Chess Board if carefully made will be equal to any that can be bought in the shops, added to which is the satisfaction of having made it yourself. The drawings are practically self explaining and no difficulty should be found in following the instructions.

Contrasting Wood

First of all choose the woods you would like to use. These days there is no trouble getting hardwoods, particularly the small amount required for this Chess Board. Two suitable woods are sycamore for the white squares and walnut or mahogany for the black squares. Four strips of each are needed,

edges are truly parallel and square to the face. (The 'face side' incidentally in this case is the underside of the strips when placed in position). They should be $1\frac{1}{4}$ ins. wide when planed.

Now get a flat board big enough to take all the strips when laid side by side, a drawing board or baking board will do very well. Next lay a sheet of newspaper on this board and glue the strips side by side, face down alternately light and dark strips (see Fig. 1). The strips should be well rubbed together, leaving as little glue as possible between them. The newspaper will prevent the strips

backing and old glue still adhering to the face.

To a Baseboard

It will be seen that the strips now consist of light and dark squares. These are again glued (still face down) on to a piece of paper placed on the baking board as before. Great care must be taken to ensure the strips are placed in the right order, that is, with the strips laid so the familiar check pattern of the Chess Board is formed (Fig. 3).

When this is set, place it on the plywood square so a border is left all

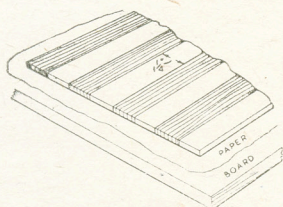


Fig. 1—The strips together

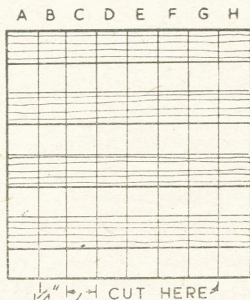


Fig. 2—Marking to cut

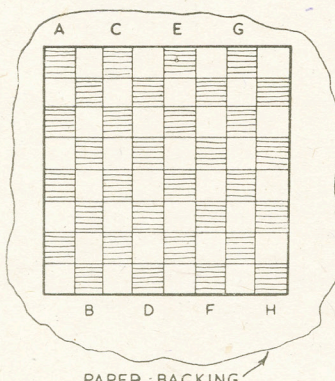


Fig. 3—Moved to alternate squares

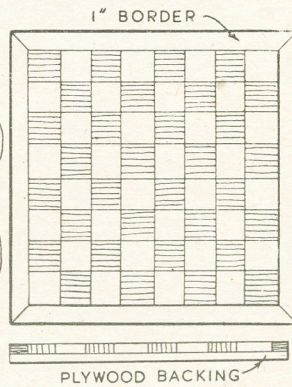


Fig. 4—The board with border

each strip being $1\frac{1}{4}$ ins. wide by $\frac{1}{4}$ in. thick and at least 12ins. long to allow for cutting and trimming. For the border four strips $1\frac{1}{4}$ ins. wide by $\frac{1}{4}$ in. thick and at least 13ins. long. For the backing a piece of plywood is required, which should be $12\frac{1}{2}$ ins. square.

First of all prepare the strips. Great care is needed here to ensure that the

striking to the baking board. Put them aside to thoroughly set.

When set, square the end and mark a strip $1\frac{1}{4}$ ins. wide (Fig. 2), allowing for planing to correct size. Now plane the sawn end again and mark, cut and plane to size another strip. Continue preparing strips until you have eight of them. Carefully clean off the paper

round. Glue it in place and while it is setting, prepare the border strips. These should be 1in. wide. Finally clean the edges of the Chess Board and mitre the border strips to fit and glue in place (Fig. 4). When all is set, level off the playing surface and either wax or french polish to suit. (135)

Improve your photography this season with these CAMERA HINTS

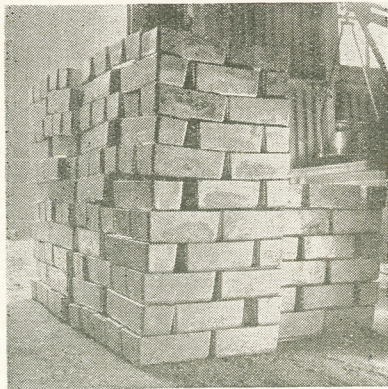
WHAT a glorious month is May! Have you ever realised what an extraordinary difference there is in almost everything in the world of out-of-doors this month and a couple of months ago? If the sun is shining there seems to be a complete change; brightness instead of dullness and, in fact, one might almost say, liveliness seems to pervade everywhere.

What a difference a spot of sun makes. It not only reawakens the natural growth of our woods and fields, it somehow makes itself felt in our minds and bodies, recreating the desire to get out and get busy again with the camera.

Light and Pictures

Do you remember that day in February last? My diary says it was the 17th—sunny all day and an extraordinary contrast to the many wet days that preceded it. We felt the urge to spend the morning in some woods not far away, with the result that some more negatives of early spring sunshine were captured.

It is of the great variation which can occur in the power or light value of the sun in May that we wish to warn you amateur photographers. It is highly important to calculate, with more precision, or at any rate use rather more care, in arriving at your exposure time



Bars of silver, each approximately 1,000 ozs.

during this month than, say, August or September.

Let us take an example. Using a fairly fast film such as Selochrome, and stop F8, the exposure time at 11 o'clock to 2 o'clock can vary from 1/150 to 1/300th of a second for a subject such as an ordinary landscape or open river or water scene. This can be accounted for by such atmospheric conditions as overhead mist, or the fact that some fleecy clouds happen to be passing at the time.

There is always the fact that we have not got quite accustomed to the full

effect of sunshine. We have still in our minds the somewhat duller days of March and April and for this reason the use of an exposure meter, with which you are familiar and know to be reliable, is most strongly advocated.

It is not our intention to deal with any one particular subject this month because we very much want to try to induce the reader to make use of the hobby this year in one particular direction. This will give you and your friends considerable interest and enjoyment and, further, if you happen to have a literary bump or a flare for writing, it should prove a means for developing that 'bump' or flare. Well, here is the idea and it is hoped that many readers will make at least one effort to produce something really good.

Several years ago it was the writer's good fortune to be asked to join a party of friends, ten all told, for a fortnight's holiday in the West Country. It was late in August, and although that holiday occurred about twenty-five years ago, practically all the interesting incidents, and even many of the smaller and trivial details, of that period of enjoyment are indelibly fixed in the memory, and in those of friends, for all time as the result of an experiment which was tried for the first time.

A Pictorial Diary

The party included some real wits, and also others who were always ready to join in a practical joke. What was of greater importance, everyone was fond of walking and not too fond of sitting on the beach for hours on end. The writer, therefore, decided to have a note book in his pocket all the time, in which to keep a record of every-day occurrences. And, of course, to make very good use of the camera for illustrating as far as possible something connected with these happenings, as well as the places visited.

We all met at Waterloo Station and the first photographic venture was to take a shot of the party outside the carriage before the train started. During the journey the note book came into use and recorded some of the items which tended to make that journey memorable. A small motor coach was to collect and take the party and the luggage to the hotel three miles from the station. It arrived half-an-hour late, but meantime we were in conversation with the station master who interested us by putting his dog through many tricks, one of which was snapped.

The coach suddenly stopped when going down a very steep hill and the driver got down and rolled underneath to find out the cause of the trouble. After a few minutes his head re-appeared and he asked if anyone had got a piece of string? It is easy to imagine the dismay and after a few seconds the laughter that this caused. Needless to say, this



The mountains here are eight to ten miles away

funny situation was the cause of another shot, as well as a very full account in the note book.

A Pleasing Record

Those are simply to give examples of what was considered worth while recording. When the holiday was completed and the negatives printed, the notes were carefully edited and written in a well-made album with a goodly number of the prints pasted on the same page or adjoining one to illustrate the written story. When this was finished it was passed round to the members for them to read and enjoy.

Since the venture proved so successful, all subsequent holidays have been treated in a similar manner. In some instances, instead of writing a full report, lantern slides have been made from the most interesting negatives and these are now used in connection with a lecture on the 'Beauty Spots of Great Britain' with jokes and historical or interesting remarks on each view as it goes through the lantern.

Preparation Helps

Every reader will gather from the foregoing what is meant by the advice which has constantly been given in these articles; to encourage a purpose in your photography. What a huge number of films are wasted every season by the unfortunate habit of taking anything and everything without giving a little thought as to whether it is likely to make a good picture or whether the print will have any more interest after it has once been seen, or can it be used for illustrating a few words in a magazine.

Church Pictures

Perhaps it would not be out of place if one or two examples regarding that last remark were given. While on a visit to one of the South Coast watering places, a suggestion was made that a visit should be paid to a little village lying between the hills at the back of the town where there was a very old church and some marvellous carvings. This appealed to the writer who was very glad to join the party and to have the opportunity of photographing the carvings which are really very wonderful.

They are life-size and hand painted, twelve in number and supposed to represent the twelve Apostles. Records indicate that they were put in position somewhere about the year, 1480. The remarkable thing about them is that both painting and woodwork is still in wonderful condition. Well, a print from the negative was readily accepted by the editor of a magazine and the description which went with the print occupied a column.

In the Works

The second example is the result of a visit to a smelting works, where, fortunately, a large quantity of silver was being smelted and turned into bars or ingots and the writer was able to secure a photograph of a stack of these. Each bar weighs approximately 1,000 ounces. This stack, as you can gather from the illustration, is worth some money!

Now, what we should all realise is, that if it is our good fortune to secure a negative of some object or view of general interest, a print from it should be submitted to a journal or magazine, not so much with the idea of receiving payment (which, of course, may be very acceptable), but to give it publicity.

You will have gathered from the foregoing that the advice intended, for the beginning of another season for most amateurs, is to keep eyes open always for items of general interest or of a curious or unique character. Quite frequently it will be found that these subjects have a very unfortunate habit of coming into vision just when they are least expected; just round a bend in the road or round a corner.

Inn Signs

For example, it may be a unique Inn Sign, a splendid group of wild flowers on a roadside bank or a peculiar bit of rock formation looking somewhat like a lion's head. The author recalls a lychgate with a room built over it, a lighthouse of only one storey, and, in the main street of a Cornish village, a farmer pushing an ordinary one-wheel barrow with a sheep firmly tied down with a rope net; presumably he was on the way to the slaughter house with the animal.

Probably this was quite a common sight to the villagers, but a very unusual one to a town dweller. Well, these will give you a little idea of the type of subjects that are useful when the camera is being used for a purpose.

Finally let us revert to the subject of the first two paragraphs—sunshine. It is the photographer's best friend. There

are still many camera owners who have the idea that their particular camera will only 'take photographs' if the sun is shining on the subject and they would not think of 'taking' anything without.

This impression may be the result of reading rather too much into the instruction booklet where exposures are discussed. It may be the outcome of a remark made by the salesman. With the cheaper form of box or folding cameras the lens has only two stops, one much larger than the other.

Stops

Generally speaking it is the small one that can only be used when the sun is shining; but when the sun is obscured by white clouds and provided there is a good light otherwise (as, for example, at midday in summer), it is quite possible to get an efficient exposure by using the large stop, which, obviously, permits more light to travel through the lens to the film.

If you happen to be wanting to make an

exposure on the beach and the sky is very full of clouds and no actual sunshine, you must bear in mind that the water will give considerable light reflection from those white clouds and if you have a fairly fast film you might even get a good result by using the small stop. Even wet pavements reflect light, so, in order to learn the possibilities of your camera, it will pay you to make a few tests.

Keep the Details

Be sure, however, to make a note in your diary of all the details connected with exposures—the time of day and condition of light, the stop used and the exposure, and also the name and speed of the film. Then, if you study the finished negatives and prints with these details, you will gain a lot of valuable information. This will serve you in good stead in the future and possibly enable you to make exposures on subjects and at times which, without this knowledge, you would not consider worth while.

Helpful Replies of Interest—

Graining

PLEASE advise me as to the best way to grain the doors of my house. (T.S.—Dyker).

TO carry out some simple oak graining, first paint the wood with the following undercoat. 1 lb. white lead ground in oil; 1 oz. yellow ochre, 1 oz. driers thinned to working consistency with linseed oil and turpentine. When dry, apply a coat of graining colour, very thinly, and grain while the paint is still wet. The graining colour is made up of two parts yellow ochre, one part burnt umber, with 2 ozs. driers to each pound of pigment. Thin down with the oil and turps.

Study a door already grained, to get the idea. For the straight graining, an ordinary domestic comb covered with a slip of calico can be used, the wide tooth end only being utilised. For the panel markings use the finger nail, covered with calico. When dry, coat with clear oak varnish. An article on this work has appeared in 'Hobbies Weekly'.

'Smeared' Polish

MY utility bedroom suite of light mahogany colour has a good polished surface, but the top of the wardrobe doors look as if heavy with grease of some kind, no matter how light or heavy we rub them, the smears remain. (G.H.—Kirkby-in-Ashfield).

IT is difficult to give a reason definitely for the smeary appearance of your wardrobe, but it is probably due to excess of linseed oil at that spot, the excess oil working out through not being properly spirited off.

We can only suggest you rub the spot over lightly with a pad of cotton wool, moistened with methylated spirit, repeating this as necessary, until the smeariness ceases. Go carefully, or you may remove the polish as well. If the spot afterwards shows, a less polished appearance than the rest, go over it with a pad moistened with thin polish.

Transformer Conversion

COULD you advise me on how to convert a rotary transformer ex-R.A.F. type, into an AC motor 210 volts. The input is 24-volt. D.C. and the output is 250-volt 50 m.a. + 6.5 volts 2.5 amps. (T.C.—Bristol).

WITH most of the units of the type mentioned, it is not possible to re-wind the coils. However, with most models quite satisfactory running from 200 to 230-volt mains will result if the mains are connected to the 250-volt points normally giving the output when the unit is used for its proper purpose.

Proper and well-insulated connections are essential, and if the motor shows any signs of overheating, the supply should be switched off.

With some types it is an advantage to connect the various windings on the field and armature in series, and this can be tried if necessary. Exact instructions on this point cannot be given because so many different types have been produced. If windings are tried in series, try reversing the ends to each because there will be a correct, and an incorrect way of connecting each winding. If the unit will run for a long time without excessive heating, connections are correct.

The handyman should know how to deal with WORN PIVOTS AND HOLES

NO piece of machinery, however simple—even a fretmachine—can be expected to give satisfactory service if it has got worn pivots or large badly shaped holes. It is very bad to let a clock, gramophone or some other piece of machinery keep running with worn pivots and holes. They should be repaired before they get worse, or they may cause further damage to the works.

The job of repairing worn pivots or holes, or of fitting new ones is not a difficult one and the average handyman is quite capable of tackling it. There is a certain amount of pleasure to be got from doing work of this kind, added to which the keen workman can add to his income very nicely by this means.

The Best

The ideal pivot, as shown at (A) is perfectly round and highly polished, its sides are parallel and straight and are a continuation of the shaft which it leaves with a nice clean square shoulder. It should be made of a hard material such as steel.

The hole in which the ideal pivot works should likewise be quite round and have straight parallel sides. Steel, hard drawn brass and bronze are the metals mostly used, while for the best class work, such as clocks, watches and scientific instruments some of the pivots run in jewel holes made of garnet or sapphire.

The chief faults that are likely to occur with pivots are shown from (B) to (E). A bent pivot (B) is quite a common source of trouble and if it is not too badly bent it can generally be straightened by the use of a pair of flat nose pliers. Go carefully and only attempt a little at a time—do not try to get it straight in just one bend. If the pivot is of hardened steel it must be softened first by placing in a gas jet or spirit lamp—it would, perhaps, be as well to adopt this method in any case.

Bent Pivots

Another very good way to straighten a bent pivot, and one much used by watchmakers, is to take a piece of brass tube that just fits over the pivot and by gradually easing it over, the bent pivot can soon be uprighted.

It sometimes happens that a pivot is worn like (C); this is commonly called a drum stick and occurs when the plates in which the pivots run are made too thin. If it has not worn down too much it can be filed parallel and polished and the pivot hole made smaller by bushing, but if it is as bad as shown at (C) a new pivot must be fitted.

The best way to file and burnish a pivot is shown at (F) where a block of hard wood having a V shaped slot cut to take the pivot is used. A file is placed on the pivot and moved to and fro, keeping

it perfectly level while the pivot is rotated either by the fingers or better still by a drillstock or small hand vice.

The same treatment can be used for the pivot shown at (D). It is unlikely that it had worn that shape, but rather that it had been badly machined when made.

A broken pivot like (E) is of very frequent occurrence and may be the result of shock such as a mainspring breaking or it may have broken when trying to straighten a bent pivot.

Fitting a new pivot is really quite a simple job, as well as being an interesting one. The steel must be softened by heating it, then file off the old piece of pivot and after very carefully centring it, drill a hole about the same size as the old pivot. It does not matter if the hole is slightly larger, but it must not on any account be smaller.

Drilling and Fitting

The hole should be drilled down to a depth of about $1\frac{1}{2}$ times the length of the pivot. Pay very special attention to getting the hole perfectly central. It may not seem very important but the extra amount of time spent in doing an accurate job here will be well worth while. It is also very necessary to keep the drill quite upright when drilling the hole.

Next take a piece of steel wire, such as a knitting needle or sewing needle and draw the temper by placing in a gas or spirit lamp flame until it is blue. Adopting the same method as shown at (F) for reducing and polishing a pivot, file the needle to fit in the drilled hole, but make it slightly tapered, so that it can be driven in tight with a few blows from a hammer. Do not make it too tapered or too tight a fit, or you may split the spindle. If it has been made carefully and is a good fit, it should not be necessary to solder it in.

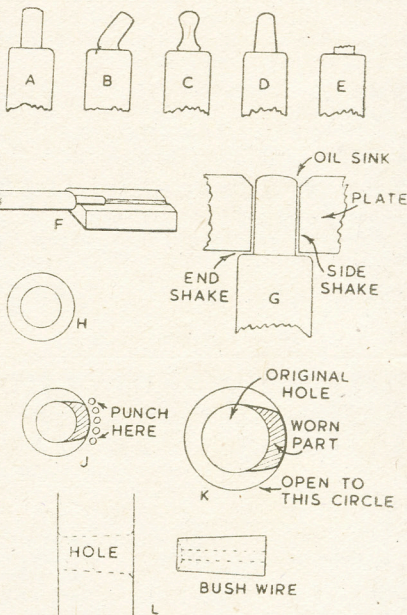
Cut off the pivot to the correct length and file it down to fit the hole, round off the end and burnish the whole to a high polish.

A good shape pivot in a well fitting hole is shown at Fig. G. There is a very small gap down the sides of the pivot which is called side shake, while a little more is allowable for end shake. The top of the hole is neatly countersunk into what is called the oil sink—this should be quite shallow and is to keep the oil from spreading all over the plate and eventually drying out altogether. Fig. H is the end view of a perfect hole and oil sink, both being true circles.

The most common type of worn hole is shown at (J) where the power of the mainspring has caused the metal to wear away on the right side. If the hole has not worn too much and the plate is not too thick, the hole may be closed by punching round the worn side. Use a round-ended punch and with light taps

from a hammer, gradually go round the worn side until the hole is practically round again; and do this only on the outside of the plate. It does not matter if you close the hole too much, it is in fact an advantage for it can then be opened out with a round tapered burnisher such as the end of a needle. This method hardens the metal and makes it wear longer, besides producing a perfectly round smooth hole.

When the hole is worn rather badly it will be necessary to bush it, and Fig. K shows the first job of centring up which is done with a round file,

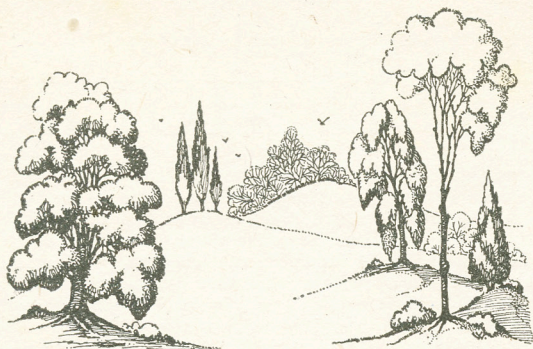


bringing the hole back to its original position only very much larger.

There are two types of bush that can be used, the first is a solid one that has to be drilled out. Fit a piece of brass or iron rod in the hole and carefully rivet it tight, countersinking both ends slightly before doing so. The kind of metal will depend on the type used for the plates. Carefully centre and drill to fit the pivot.

The other method which is adopted by most watchmakers is to open out the hole as before, but this time making it slightly tapered from the inside of the plate. Then push in a specially prepared tapered bush (see Fig. L) which is already drilled out perfectly true and central, and rivet it over. The hole is then opened out to the correct size to take the pivot. These bushes can be obtained from watch and clock material dealers or from an ordinary watchmaker.

It is very important to drill all holes perfectly upright when fitting bushes and also to leave all holes well polished and to leave no rough edges. (136)



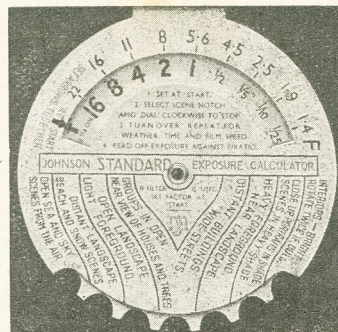
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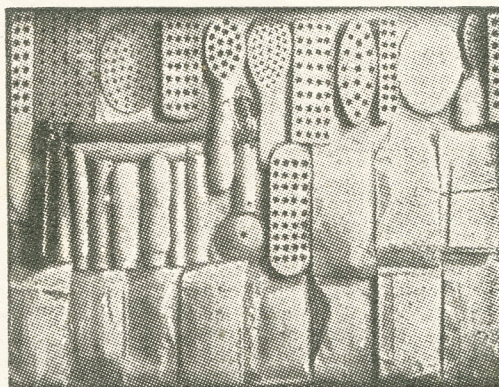
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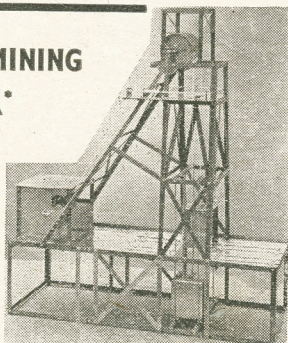
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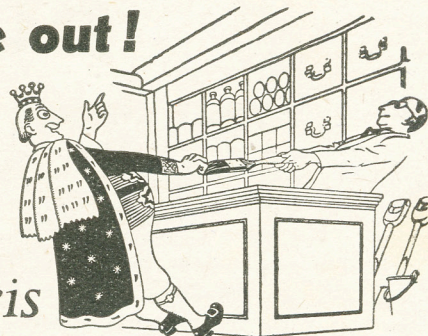
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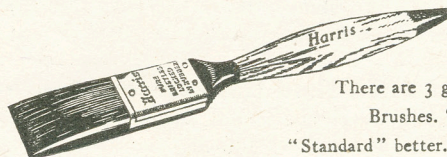
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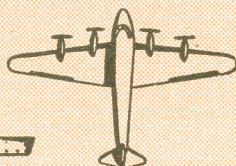
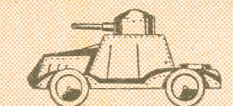
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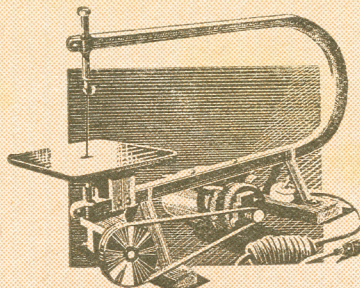
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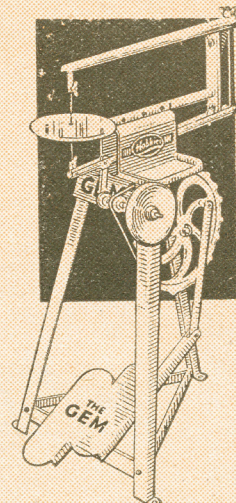
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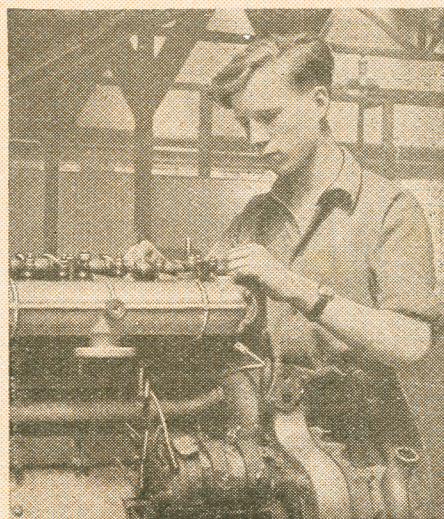
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